STATE OF ALASKA
ALASKA OIL AND GAS CONSERVATION COMMISSION
333 West 7th Avenue, Suite 100
Anchorage Alaska 99501

Re: THE APPLICATION OF Union Oil Company of California for an Aquifer Exemption Order for the Ivan River Unit in Township 13 North, Ranges 8 and 9 West, and Township 14 North, Ranges 8 and 9 West, Seward Meridian, Matanuska-Susitna Borough, in conformance with 20 AAC 25.440.	)	Docket Number: AEO-11-01 Aquifer Exemption Order No. 14 Ivan River Unit Undefined Gas Pool Matanuska-Susitna Borough Alaska June 20, 2011

IT APPEARING THAT:

1. By application dated April 14, 2011, Union Oil Company of California (Union), operator of the Ivan River Unit (IRU), requested an order from the Alaska Oil and Gas Conservation Commission (Commission) exempting aquifers in the Beluga 71-3 strata, within the IRU, Matanuska-Susitna Borough, Alaska.
2. On April 20, 2011, pursuant to 20 AAC 25.540, the Commission published in the Peninsula Clarion, on the State of Alaska's Online Public Notice Web site, and on the Commission's Internet website, notice of opportunity for public hearing on May 26, 2011.
3. Union's proposed underground storage of dry natural gas is excluded from federal Underground Injection Control (UIC) regulations under 40 CFR 144.1 (g) (2) (iv).
4. The Commission has authority to issue an aquifer exemption. 20 AAC 25.440.
5. The Commission held a public hearing on May 26, 2011 at 333 West 7th Avenue, Suite 100, Anchorage, Alaska 99501. Only testimony from Union was offered. No protests or written comments were received.

FINDINGS:

1. Operator: Union operates the IRU, which is located on the west side of the Cook Inlet, Matanuska-Susitna Borough, Alaska.
2. Extent of Aquifer Exemption Area: The affected area proposed in Union's aquifer exemption application lies within the IRU, and is described as:

   T13N, R8W, S6: NW ¼, NW ¼ SW ¼, Seward Meridian (SM);

   T13N, R9W, S1: E ½, SM;

   T14N, R8W, S31: S ½ SW ¼, NW ¼ SW ¼, SW ¼ NW ¼, SM; and

   T14N, R9W, S36: SE ¼ and SE1/4 NE ¼, SM.

3. Affected Strata: The Freshwater Aquifer Exemption request is for the strata (Beluga 71-3 Strata) between the top of the PC4 Coal at 6,809' measured depth (MD; equivalent to -5,223' TVDSS)1 and the top of the PC5 Coal at 6,919' MD (-5,304' TVDSS). These strata are illustrated on Figure 1, below.

4. Geology: In the IRU area, shallow, Quaternary-aged sand and gravel accumulations that extend to a depth of approximately -3,000' TVDSS typically serve as the freshwater aquifers. Directly beneath these aquifers are Tertiary-aged, fluvial-derived, reservoir and non-reservoir deposits assigned to the Kenai Group. This Group is subdivided into (in descending order) the Sterling, Beluga, Tyonek, Hemlock, and West Foreland formations, and these formations account for most of the commercial oil and gas production in the Cook Inlet Basin.

   The affected freshwater aquifers lie within the Beluga 71-3 Strata (see Figure 1), which include the Beluga 71-3 Sand. This sand, which occurs between 6,829' and 6,856' MD (-5,237' and -5,257' TVDSS, respectively) in well IRU 44-36, is a depleted gas reservoir that is overlain and underlain by interbedded siltstone, mudstone, and coal layers that form laterally-continuous top and bottom seals.

5. Groundwater Hydrology: Three shallow water wells in the IRU area are recorded with the State of Alaska. Two are within the IRU and the third is located at Stump Lake, approximately 3 miles away. These wells range in depth from 245' to 318' below ground surface. There are no other recorded water wells within a radius of about 8 miles from the proposed Aquifer Exemption Area.[2]

6. Formation Water Salinity: The salinity of formation water within the Beluga 71-3 Strata was estimated by log calculations and confirmed using water samples obtained from the Sterling 59-6 Sand in the IRU 44-36 well.

   Total dissolved solids (TDS) concentrations estimated by Union using Pickett Plots range from about 6,000 mg/l to 10,000 mg/l within the Beluga 71-3 Strata and from 4,100 mg/l to 26,000 mg/l for the overlying the Sterling and Beluga intervals. Union's estimated TDS value for the Beluga 71-3 Sand is about 9,300 mg/l.

   The accuracy of these estimated TDS values can be verified using information from the Sterling 59-6 Sand, which lies about 200' above the Beluga 71-3 Sand in well IRU 44-36. Although gas is present in the Sterling 59-6 Sand (as demonstrated by cross-over of neutron and density well log curves within the sand), Union's estimated average TDS concentration for the sand is about 6,200 mg/l, which agrees reasonably with laboratory measurements of 7,076 and 7,286 mg/l for two water samples taken from the sand during 2005.[3]

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[1] The acronym TVDSS refers to true vertical depth subsea (true vertical depth below sea level). To avoid confusion, when depths presented in the text represent true vertical depth subsea, the footage will be preceded by a minus sign and followed by the acronym TVDSS (e.g., 3,000' true vertical depth subsea will be depicted as -3,000' TVDSS).

[2] According to the Alaska Department of Natural Resources' Water Rights Geographic Information System and Land Administration System Case Abstracts websites.

[3] Commission senior staff confirmed Union's estimated TDS concentrations for the Sterling 59-6 and Beluga 71-3 intervals utilizing well log data and techniques that are compatible with EPA guidance document "Survey of Methods to Determine Total Dissolved Solids Concentrations," (EPA LOE Contract No. 68-03-3416, Work Assignment No. 1-0-13, KEDA Project No. 30-956, September 1988, Revised September 1989).

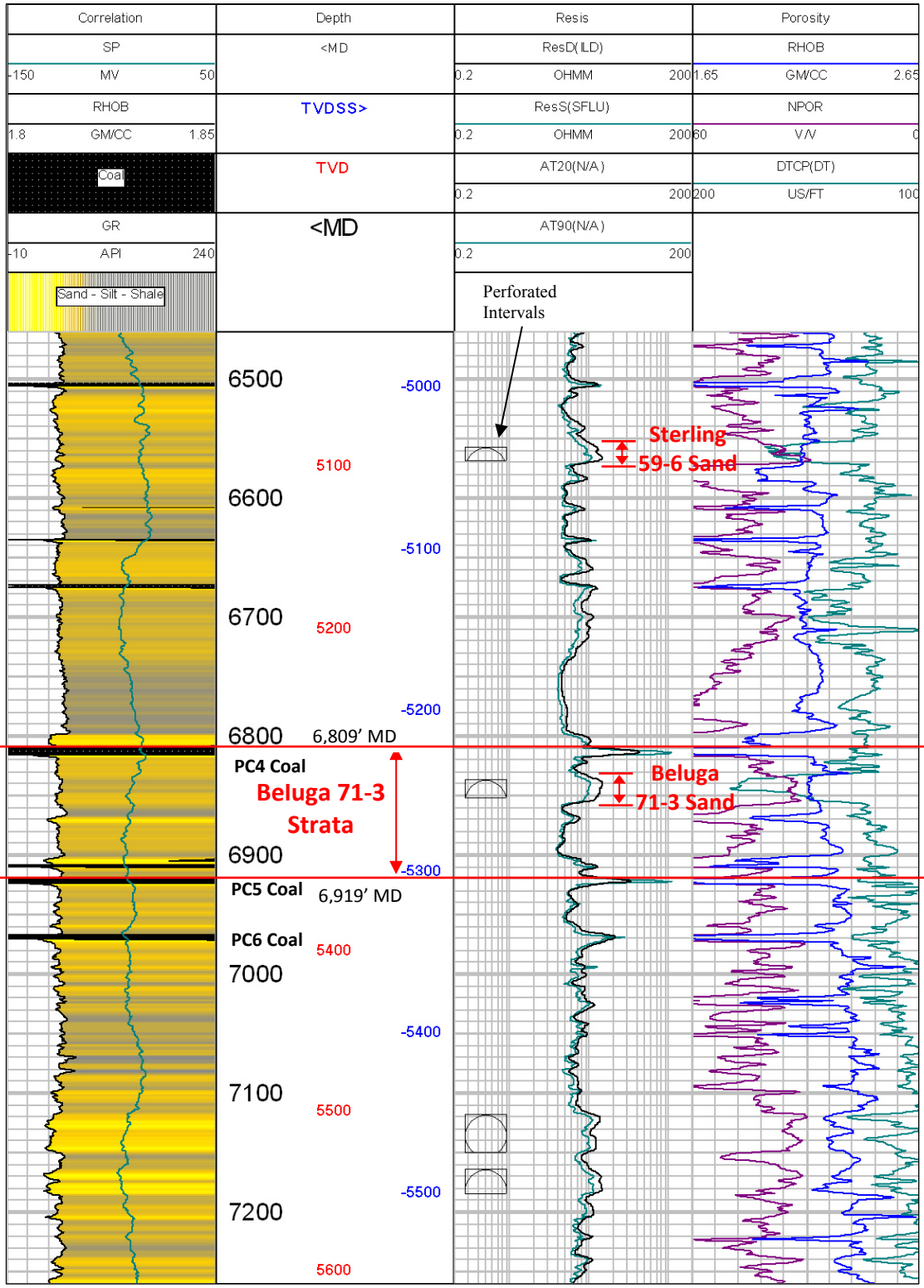

Figure 1. Ivan River Unit No. 44-36

7. Suitability of IRU Sediments as Drinking Water Aquifers: Pursuant to 20 AAC 25.440 (a) (1), the subject aquifer exemption requested by Union is supported by the following:

   a. the Ivan River Unit area encompasses plentiful surface and groundwater to a depth of about 318' below ground surface;

   b. the now-depleted Beluga 71-3 Strata produced commercial quantities of hydrocarbon gas intermittently from 1993 to 2008;

   c. within the IRU area, aquifers in the Beluga 71-3 Strata are sufficiently deep that recovery of drinking water is economically impractical; and

   d. well log analysis, supported by laboratory measurements, demonstrates that TDS concentrations within the Beluga 71-3 Strata are greater than 3,000 mg/l.

CONCLUSIONS:

1. Those portions of freshwater aquifers occurring in the Beluga 71-3 Strata within the affected area do not currently serve as sources of drinking water. All known and foreseeable ground water consumption from the Ivan River vicinity is consistent with plentiful surface water and groundwater resources occurring above a depth of about 318' below ground surface.

2. Those portions of freshwater aquifers occurring in the Beluga 71-3 Strata within the affected area contain hydrocarbon gases, TDS concentrations greater than 3,000 mg/l, and are situated at locations and depths that make recovery of these waters for drinking water purposes economically impractical.

3. The aquifers occurring in the Beluga 71-3 Strata within the proposed affected area cannot reasonably be expected to serve as underground sources of drinking water.

4. The aquifers occurring in the Beluga 71-3 Strata within the affected area qualify as exempt freshwater aquifers under 20 AAC 25.440(a)(1)(A), 20 AAC 25.440 (a)(1)(B), and 20 AAC 25.440(a)(2).

NOW, THEREFORE, IT IS ORDERED THAT the aquifers occurring in the Beluga 71-3 Strata in the following areas are exempt as provided by 20 AAC 25.440 for the purposes of gas storage injection operations:

T13N, R8W, S6: NW ¼, NW ¼ SW ¼, SM;
T13N, R9W, S1: E ½, SM;
T14N, R8W, S31: S ½ SW ¼, NW ¼ SW ¼, SW ¼ NW ¼, SM; and
T14N, R9W, S36: SE ¼ and SE1/4 NE ¼, SM.

Note that this Order does not authorize the injection of any fluids or gas within the exemption area. Storage Injection Order No. 10 governs storage injection operations within the exemption area.

DONE at Anchorage, Alaska, and dated June 20, 2011.

John K. Norman, Commissioner
Alaska Oil and Gas Conservation Commission

Cathy P. Foerster, Commissioner
Alaska Oil and Gas Conservation Commission

RECONSIDERATION AND APPEAL NOTICE

As provided in AS 31.05.080(a), within **20** days after written notice of the entry of this order or decision, or such further time as the Commission grants for good cause shown, a person affected by it may file with the Commission an application for reconsideration of the matter determined by it. If the notice was mailed, then the period of time shall be **23** days. An application for reconsideration must set out the respect in which the order or decision is believed to be erroneous.

The Commission shall grant or refuse the application for reconsideration in whole or in part within 10 days after it is filed. Failure to act on it within 10-days is a denial of reconsideration. If the Commission denies reconsideration, upon denial, this order or decision and the denial of reconsideration are **FINAL** and may be appealed to superior court. The appeal **MUST** be filed within **33** days after the date on which the Commission mails, **OR 30** days if the Commission otherwise distributes, the order or decision denying reconsideration, **UNLESS** the denial is by inaction, in which case the appeal **MUST** be filed within **40** days after the date on which the application for reconsideration was filed.

If the Commission grants an application for reconsideration, this order or decision does not become final. Rather, the order or decision on reconsideration will be the **FINAL** order or decision of the Commission, and it may be appealed to superior court. That appeal **MUST** be filed within **33** days after the date on which the Commission mails, **OR 30** days if the Commission otherwise distributes, the order or decision on reconsideration. As provided in AS 31.05.080(b), "[t]he questions reviewed on appeal are limited to the questions presented to the Commission by the application for reconsideration."

In computing a period of time above, the date of the event or default after which the designated period begins to run is not included in the period; the last day of the period is included, unless it falls on a weekend or state holiday, in which event the period runs until 5:00 p.m. on the next day that does not fall on a weekend or state holiday.